

REMARKS

In the Office Action, claims 1, 3-12, 14-18, 21-27 and 30-35 are rejected. Claims 2, 13, 19, 20, 28, 29 and 36 are objected to. Claims 37 and 38 are allowed. In the present response, claims 22 and 30 are amended to clarify the scope of the claims. Claims 1-38 are, therefore, currently pending. Upon consideration of the present amendments and remarks, reconsideration and allowance of all pending claims is respectfully requested.

Rejections Under 35 U.S.C. § 102

The Examiner rejected claims 1, 3-10 and 22-27 under 35 U.S.C. § 102(b) as being anticipated by EP 1,102, 076 (the Hajnal reference). The Applicants respectfully traverse this rejection.

A prima facie case of anticipation under 35 U.S.C. § 102 requires a showing that each limitation of a claim is found in a single reference, practice or device. *In re Donohue*, 226 U.S.P.Q. 619, 621 (Fed. Cir. 1985). As the Applicants will demonstrate, the reference cited by the Examiner fails to disclose one or more acts and/or functions recited in independent claims 1 and 22, as well as those claims depending therefrom. In view of these inadequacies, no *prima facie* case of anticipation has been established by the Examiner.

In general, the present application discloses a technique for obtaining coil sensitivities near the edge of an object imaged during calibration of a magnetic resonance imaging system. *See* Application, paragraph 31. In particular, the present application discloses a technique for correcting measurement inaccuracies near the edge or for providing values for missing measurements. *Id.* The technique uses a function to calculate the sensitivities of pixels near the edge pixels of the calibration image, such as by extrapolation. *See* Application, paragraphs 33-34. Due to measurement inaccuracies near the edge of the imaged object, pixels inward from the edge may be used as the basis for the function, such as the extrapolation. *See* Application, paragraph 35. The

calculated sensitivity values may then be used in place of inaccurate or absent pixel values near the edge of the imaged object. *See* Application, paragraphs 36-37.

The reference of Hajnal et al. discusses the general collection of coil sensitivity information at a low resolution by ratioing, but does not address correction of edge and near-edge pixel values. *See* Hajnal et al., col. 4, lines 50-53. In particular, the reference of Hajnal et al. discloses obtaining high SNR reference data, i.e., calibration data, by reducing the resolution of the full FoV reference acquisitions, but maintaining approximately constant imaging time by multiply averaging. *See* Hajnal et al., col 6, lines 46-50. The use of multiply averaged reference data, compared to single average reference data, provides artifact-free unfolded images. *See* Hajnal et al., col. 7, lines 20-25. The reference of Hajnal et al., however, does not discuss or disclose the problems associated with the measured values of edge and near-edge pixels. Instead, the reference of Hajnal et al. appears to merely relate to the multiply averaged reference data as opposed to single average reference data. With these distinctions between the reference of Hajnal et al. and the present application in mind, the Applicants make the following remarks.

With regard to claim 1, the step of locating an edge pixel is recited. The Examiner has equated this recitation to elements P_1 and P_2 of Figs. 1, 2, and 12 of the Hajnal et al. reference. Upon reviewing Figs. 1 and 12, however, the Applicants respectfully note that elements P_1 and P_2 are not edge pixels, but are instead interior pixels. This is confirmed by the reference of Hajnal et al., in which the elements P_1 and P_2 are merely described as separate points in the imaged object. *See* Hajnal et al. col. 2, lines 38-39, 50-53; col. 3, lines 1-23. Indeed the entire discussion of P_1 and P_2 occurs within the background of Hajnal et al. and is merely used to explain the concept of unfolding an aliased image. Furthermore, Fig. 2 of the Hajnal et al. reference does not disclose an edge pixel, much less the step of locating an edge pixel as recited. Instead Fig. 2 depicts a K-space matrix of seemingly identical data points. *See* Hajnal et al., col. 1, lines 52-54. Contrary to the Examiner's position, neither Figs. 1, 2 or 12 of the Hajnal

et al. reference disclose an edge pixel, much less the recited step of “locating an edge pixel.”

Furthermore, the Hajnal et al. reference does not disclose the recited step of “calculating a sensitivity function describing coil sensitivity for the edge pixel based upon two or more fitting pixels inward of the edge pixel.” As noted above, the reference of Hajnal et al. does not disclose an edge pixel. Nor, therefore, does the Hajnal et al. reference disclose two or more fitting pixels inward of the edge pixel. As one might expect, therefore, the Hajnal et al. reference does not disclose calculating a sensitivity function for the edge pixel based upon two or more fitting pixels.

The Examiner has indicated that this step is present in the Hajnal et al. reference at column 3, lines 1-58 and column 4, lines 50-58. Upon review by the Applicants, however, the cited portions do not disclose edge pixels, the fitting pixels, or the calculation of a sensitivity function describing coil sensitivity of an edge pixel. Instead, the cited passages appear to be background material related to aliased image data that refer to the same separate points P_1 and P_2 discussed above.

To the extent that the cited passages discuss obtaining sensitivity data, they directly contradicts the Examiner’s assertions. In particular, the cited passages state that, “[t]he sensitivity information may be collected by ratioing each of the receive coils with a body coil, or by ratioing the sensitivities of the two r.f. receive coils themselves.” See Hajnal et al., col. 4, lines 50-53. This passage does not support the Examiner’s assertion that Hajnal et al. teach calculating a sensitivity function near an object edge based upon two or more inward fitting pixels. If the Examiner wishes to maintain that the reference of Hajnal et al. discloses edge and fitting pixels, as well as the recited steps pertaining to locating and using such pixels, the Applicants respectfully request that the Examiner provide *specific* citations demonstrating the presence of these recited elements and steps within the reference of Hajnal et al. In view of the preceding comments, the Applicants

respectfully request reconsideration and allowance of independent claim 1 and those claims depending from claim 1.

The Applicants respectfully note that claims 22 and 30 have been amended to clarify the scope of the claims. The present amendments are believed to broaden the scope of claims 22 and 30, and those claims depending therefrom, and are not made in response to the respective rejections made by the Examiner. Indeed, Applicants traverse the rejection of claim 22 and those claims depending therefrom.

In particular, the Applicants respectfully note that claim 22 is directed to a magnetic resonance imaging system comprising an analysis circuit that locates an edge pixel and calculates a sensitivity function from two or more fitting pixels. As noted above, with regard to claim 1, these recitations are entirely absent from the reference of Hajnal et al. Therefore, based upon the Applicants preceding remarks, the Applicants respectfully request reconsideration and allowance of independent claim 22 and those claims depending from claim 22.

Rejections Under 35 U.S.C. § 103

The Examiner rejected claims 11, 12, 14-18, 21, and 30-35 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,559,642 (the King reference), and further in view of U.S. Patent No. 6,380,741 (the U.S. Hajnal reference). The Applicants respectfully traverse this rejection.

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572,

1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988).

The Applicants respectfully note that the King reference, which issued on May 6, 2003, would be available as prior art only under 35 U.S.C. § 102(e)/103(a). However, Applicants respectfully point out that the King reference is unavailable as prior art under 35 U.S.C. § 103(c). Applicants respectfully refer the Examiner to 35 U.S.C. § 103(c) which states:

Subject matter developed by another person, which qualifies as prior art under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

In accordance with 35 U.S.C. § 103(c) and Pub. L. 106-113, § 4807, enacted November 29, 1999, subject matter developed by another person which qualifies as prior art only under subsection (e) of 35 U.S.C. § 102, shall not preclude

patentability where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. Here, the present application and the King reference are both assigned to GE Medical Systems Global Technology Company, LLC or subject to an obligation of assignment to GE Medical Systems Global Technology Company, LLC at the time the invention was made. Thus, the King reference is unavailable as prior art under 35 U.S.C. § 103(c). With the King reference being unavailable as prior art, Applicants respectfully submit that the rejection cannot stand because the U.S. Hajnal reference fails to disclose all of the recited features.


In view of the unavailability of the King reference and the deficiencies of the U.S. Hajnal reference, the Applicants respectfully request reconsideration and allowance of independent claims 11 and 30, and those claims depending therefrom.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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John M. Rariden
Reg. No. 54,388
FLETCHER YODER
P.O. Box 692289
Houston, TX 77269-2289
(281) 970-4545